

REMARKS

Claims 1-3, 5-18, 20, 21, 23, 24 and 26-30 are currently pending in the subject application and are presently under consideration.

Claims 20 and 26 have been amended as shown on pages 2-5 of the Reply to recite limitations similar to that already recited in independent claim 1. Accordingly, the herein amendments do not raise new issues requiring undue search or consideration; and entry thereof is respectfully requested.

Applicants' representative respectfully thanks Examiner Ehichioya for the courtesies extended during the teleconference of May 19, 2008 where the below noted distinctions of the claimed invention over the cited art were discussed. Applicants' representative has forwarded a draft version of this Response to the Examiner for consideration to expedite favorable prosecution.

Favorable reconsideration of the subject patent application is respectfully requested in view of the comments and amendments herein.

I. Rejection of Claims 1-11 and 26-30 Under 35 U.S.C. §101

Claims 1-11 and 26-30 stand rejected under 35 U.S.C. §101 because the claimed invention is directed to non-statutory subject matter. Withdrawal of this rejection is respectfully requested for at least the following reasons. Claims 1 and 26 recite computer implemented systems and methods that are utilized in management of locks on database resources. The claims pertain to a computer executable lock manager that stores a reference count of child locks within a parent locks so that the parent lock is released upon releasing all the child locks. Such a system produces a concrete, tangible result of a reference count of child locks stored within parent locks, which is useful for determining the lifetime of the parent locks. Accordingly, it is submitted that the computer implemented system and method recited in the subject claims produces a useful, concrete and tangible result and is therefore statutory.

II. Rejection of Claims 1, 5, 8, 9, 11-14, 17, 21 and 23-24 Under 35 U.S.C. §103(a)

Claims 1, 5, 8, 9, 11-14, 17, 21 and 23-24 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Ashok M. Joshi (US 5,414,839) in view of Non-Patent Literature "Concurrent Access to Point Data" by Ng, *et al.* Withdrawal of this rejection is requested for at

least the following reasons. Joshi or Ng *et al.* alone or in combination fail to teach or suggest each and every feature of the subject invention.

Applicants' claimed invention relates to systems and methods for supplying a database with a parent-child lock hierarchy arrangement, such that each lock contains sufficient information to determine its own lifetime. In particular, claim 1 recites *a computer implemented database management system comprising a lock manager that acquires a parent lock and one or more child locks on resource(s) of a database, the lock manager stores a reference count of the one or more child locks within the parent lock such that, **as each child lock is released, the reference count decrements by a value of one and the parent lock is released upon release of all child locks associated therewith.*** Independent claims 12 and 21 recites similar features. Joshi and Ng *et al.* do not disclose or suggest such novel features recited by the subject claims.

Joshi relates to a database system that uses lock escalation and de-escalation protocols in a concurrency control mechanism. A lock granularity tree with a root node and leaf nodes of lower granularity, organizes records of a table into a hierarchy. At the cited portion on col.12, lines 56-57, Joshi discloses the child lock being released, but is silent regarding the step taken *as each child lock is released*. At page 5 of the Final Office Action, the Examiner concedes that Joshi does not teach the reference count decrements by a value of one and the parent lock is released upon the release of all child locks associated therewith. The Examiner cites Ng *et al.* to cure the aforementioned deficiencies of Joshi.

Ng *et al.* relates to a lock-coupling technique to B+-tree, the R-tree and the KDB tree to allow concurrent operations. At the cited portions, Ng *et al.* discloses a method **for avoiding any change to a parent node before the locking of its child nodes are completed. For every parent node a p lock on the node must be acquired and held until the p locks on the child nodes to be visited are acquired** (See. pg. 370, section 4.1 first paragraph). A counter in the parent is initialized to the number of subsearch operations initiated at a node, and is decremented whenever a child lock is p-locked (See. pg. 369, section 3.1 second paragraph). When the counter value is zero, *ie.* all the child nodes are p-locked, the lock on the parent is released. Further at the cited portions of item 2, col. 1 pg. 370, Ng *et al.* discloses a search carried out by calling Bt.Search, by carrying out the steps of acquiring a lock on the node P, on checking that the node is not a root node, acquiring locks for each child and decrementing the counter, releasing the parent lock when the count is zero, and releasing each of the child locks. Thus, Ng

et al. provides for a parent node to acquire and hold a lock until all the child nodes to be visited acquire locks. Once all the child nodes acquire their locks, the lock on the parent is released. The reference count maintained at the parent decrements every time a lock on the child is acquired. In contrast, the claimed invention allows for a parent lock to be held ***until all its child locks are released***. The reference count maintained at the parent decrements *every time a lock on the child is released*. Thus, Ng *et al.* is silent regarding ***as each child lock is released, the reference count decrements by a value of one and the parent lock is released upon release of all child locks associated therewith*** as recited by the subject claims.

More particularly, contrary to the teachings of Ng *et al.* which requires no change to the parent before all locking of child nodes is complete, the claimed invention provides for the parent node to decrement its reference count as respective locks of the child nodes are released. Thus, Ng *et al.* teaches away from the claimed invention. Furthermore, Ng *et al.* discloses child locks being acquired rather than release of child locks as in the claimed invention. Even if the cited art were combined as suggested, applicants' claimed invention would not result.

In view of the above, it is readily apparent that Joshi and Ng *et al.* alone or in combination, do not teach or suggest all limitations as recited in independent claims 1, 12 and 21 (and the claims that depend from). Accordingly, it is respectfully requested that this rejection should be withdrawn.

III. Rejection of Claims 2, 3, 10, 15, 18 and 20 Under 35 U.S.C. §103(a)

Claims 2, 3, 10, 15, 18 and 20 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Joshi in view of Ng, *et al.* and further in view of Chan, *et al.* (US 6,108,654). Withdrawal of this rejection is requested for at least the following reasons. Claims 2, 3, 10, 15 and 18 depend from independent claims 1 and 12. Amended independent claim 20 recites similar features as independent claim 1, namely *wherein the lifetime of the locking means ends when the locks associated with all the children are released*. As discussed *supra*, Joshi and Ng *et al.* alone or in combination fail to teach or suggest each and every feature of independent claims 1 and 12. Chan *et al.* relates to finer-grained dynamic allocation and de-allocation of locks in a system, while protecting against abnormal termination that may result in data integrity problems, but fails to cure the aforementioned deficiencies of ***as each child lock is released, the reference count decrements by a value of one and the parent lock is released upon release of***

all child locks associated therewith. Accordingly, it is requested that this rejection with respect to claims 2, 3, 10, 15 18 and 20 be withdrawn.

IV. Rejection of Claims 6 and 16 Under 35 U.S.C. §103(a)

Claims 6 and 16 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Joshi in view of Ng and further in view of Bray, *et al.* Withdrawal of this rejection is requested for at least the following reasons. Claims 6 and 16 depend from independent claim 1. As discussed *supra*, Joshi and Ng *et al.* alone or in combination fail to teach or suggest each and every feature of independent claim 1. Bray *et al.* relates to systems and a method for locking elements in a hierarchical data structure to allow multiple users at various distributed clients to simultaneously edit unlocked portions of the data structure, but fails to cure the aforementioned deficiencies of *as each child lock is released, the reference count decrements by a value of one and the parent lock is released upon release of all child locks associated therewith*. Accordingly, it is requested that this rejection with respect to claims 6 and 16 be withdrawn.

V. Rejection of Claims 26-30 Under 35 U.S.C. §103(a)

Claims 26-30 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Joshi in view of Chan, *et al.* (US 6,108,654). Withdrawal of this rejection is requested for at least the following reasons. Joshi and Chan *et al.* alone or in combination fail to teach or suggest each and every feature of the subject invention.

Applicants' claimed invention relates to systems and methods for supplying a database with a parent-child lock hierarchy arrangement, such that each lock contains sufficient information to determine its own lifetime. In particular, amended independent claim 26 recites similar features as independent claim 1, namely *the lock manager creates within the parent lock a reference count of the child lock, the reference count is decremented by one on the release of each child lock, the lock manager releases the parent lock upon the reference count attainment of a zero value*. Joshi and Chan *et al.* are silent regarding such novel features.

As discussed *supra*, with respect to independent claim 1, Joshi fails to disclose the feature of as child locks are released, decreasing the reference counter in the parent by one and determining release of the parent lock based on the child locks.

Chan *et al.* relates to finer-grained dynamic allocation and de-allocation of locks in a system, while protecting against abnormal termination that may result in data integrity problems. At page 13 of the Final Office Action, the Examiner contends that Chan *et al.* teaches such novel features of applicants' claimed invention. Applicants' representative avers to the contrary. At the cited portions, Chan *et al.* discloses recovery domains that allow the lock manager to identify and clean up multiple dubious resource objects as a group. When a process attaches to a recovery domain, a reference count of the domain is incremented. When a dead process detaches, the reference count is decremented. Thus, the reference count is the number of processes currently attached to the domain in the local lock manager instance (See. col. 12, lines 34-38). Thus, Chan *et al.* is silent regarding a reference count maintained by a parent on the number of locked child nodes. In contrast, the claimed invention allows for a lock manager that creates within the parent lock a reference count of the number of child locks, decrements the count as each child lock is released, and releases the parent lock when all the child locks are released. Thus, Chan *et al.* is silent regarding ***the reference count is decremented by one on the release of each child lock, the lock manager releases the parent lock upon the reference count attainment of a zero value*** as recited by the subject claims.

In view of the above, it is readily apparent that Joshi and Chan *et al.*, alone or in combination, do not teach or suggest all limitations as recited in independent claim 26 (and the claims that depend from). Accordingly, it is respectfully requested that this rejection should be withdrawn.

CONCLUSION

The present application is believed to be in condition for allowance in view of the above comments and amendments. A prompt action to such end is earnestly solicited.

In the event any fees are due in connection with this document, the Commissioner is authorized to charge those fees to Deposit Account No. 50-1063 [MSFTP622US].

Should the Examiner believe a telephone interview would be helpful to expedite favorable prosecution, the Examiner is invited to contact applicants' undersigned representative at the telephone number below.

Respectfully submitted,

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